REMARKS

Claim Rejections – 35 USC § 112

The Office rejected claims 3, 6, 8, 12, 14, 22-24, and 26 as indefinite for containing the term "about", and an alleged use of the term "term" (Para 3, line 2), and alleged lack of antecedent basis for phrases appearing in claims 8, 22, and 23. The applicant notes that the word "term" does not appear in any of the claims. The applicant has amended claims containing the "term about" to instead contain the phrase "about approximately". The applicant respectfully refers the Office to MPEP § 2173.05(b) for a discussion of relevant terms. The applicant respectfully submits that it is well within the understanding of one skilled in the art to comprehend the tolerances that are attainable in the present art. Furthermore, the applicant has amended claims 8 and 23 to provide the required antecedent basis.

With respect to claims 1 and 22, the applicant notes that only a single n^+ GaN layer is referred to in the claim, specifically the "n^+ GaN quasi-substrate layer". The applicant find the rejection of this terminology as indefinite puzzling as only one GaN layer is disclosed as a quasi-substrate (*Cf.* Fig 1B, the layer between the sapphire and the n- GaN base) specifically, that upon which the subsequent layers are built. The applicant respectfully submits that it would be within the knowledge of one of ordinary skill in the art to comprehend that it is intended that the etching pass through the layers of the disclosed structure until it contacted the n+ GaN layer that acted as a substrate for that structure. The applicant respectfully submits that in light of this explanation, the Office's allegation of indefiniteness should be withdrawn.

At least for these reasons, the applicant respectfully request that the Office withdraw its rejections under 35 USC 112, first and second paragraphs.

Claim Objections

In the first paragraph of the Office's claim objections, the Office objects to claims 1 and 22 since n- GaN is not introduced prior to the element "etching a recessed base layer to **an** n-GaN quasi-substrate layer grown on a n+ GaN quasi-substrate layer" [Emphasis added]. The applicant respectfully submits that the n- GaN quasi-substrate layer has proper antecedent basis, the applicant is therefore, confused as to why the Office has objected to this terminology

Regarding the Office's objection in paragraph 3, the applicant respectfully submits that, in one embodiment, the ohmic metallization is applied to both n+ GaN layers illustrated in Fig. 1 B. The applicant, however, reminds the Office that claims 1 and 22 only recite a single n+ GaN layer as necessary for the claimed method. The applicant respectfully requests that the Office withdraw its objection.

Claim Rejections – 35 USC § 103

The Office has quoted the statute from 35 USC 103(a), which is referenced herein. The Office has rejected claim 1, 3-6, 8-10, 12-14, and 21-26 as being unpatentable over US Patent No. 6,156,581 issued to Vaudo et al. in view of other references. Applicant has carefully considered the Office rejections and respectfully submits that the amended claims, as supported by the arguments herein, are distinguishable from the cited reference.

According to the MPEP §2143.01, "[o]bviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found in either the references themselves or in the knowledge generally available to one of ordinary skill in the art."

A useful presentation for the proper standard for determining obviousness under 35 USC §103(a) can be illustrated as follows:

1. Determining the scope and contents of the prior art;
2. Ascertaining the differences between the prior art and the claims at issue;
3. Resolving the level of ordinary skill in the pertinent art; and

4. Considering objective evidence present in the application indicating obviousness or unobviousness.

The Office rejected Claim 1, 3-6, 9, 10, 12-14 under 35 USC 103(a) as being unpatentable over the '581 reference in view of U.S. Patent No. 5,929,467 issued to Kawai et al., U.S. Patent No. 4224361 issued to Romankiw et al., U.S. Published Application No. 2003/0015708 of Parikh et al., U.S. Patent No. 5,215,619 issued to Cheng et al., U.S. Patent No. 6,690,042 issued to Khan et al., and U.S. Patent No. 5,175,597 issued to Cachier et al.. The Applicant has carefully reviewed the cited references and respectfully disagrees.

In contrast to the claimed invention, the '619 reference fails to disclose a ramp down in voltage. The office alleges that such a ramp down in chuck bias voltage is disclosed by the '619 reference at Col. 10, ll. 5-12. The applicant respectfully submits that this is incorrect. The cited reference, in the cited lines, describes the use of a magnetic field in combination with bromiate and iodinate etching chemistries. This combination of magnetic field and etch chemistry allows the user to achieve a similar effect as customary etching, but at lower bias voltage which results is reduced wafer damage. In contrast to the claimed invention, the utilization of a magnetic field is used as a substitute for some of the RF power and chuck bias voltage of traditional etch techniques. Col. 10, ll. 5-12 discloses "Increasing the magnetic field increases the etch rate, and thus a given etch rate can be obtained by increasing the magnetic field and decreasing the RF power and the resulting voltage." The cited reference does not disclose a change in the bias voltage during the etch process, merely that the use of a lower bias voltage is permissible with increased magnetic field.

The ramp down of bias voltage of the claimed invention permits initial high rates of etching. Unfortunately, such high etch rates are typically associated with high degrees of damage to the etched surface, which must subsequently be further processed to obtain a desired smooth surface. The voltage ramp down of the claimed invention avoids this, starting with a high etch rate initially, but a reduced etch rate as the process progresses. This results in less damage to the surrounding surface and a higher quality outcome.

The '619 reference utilizes a magnetic field as a substitute for the RF power and current of typical etch processes, thus decreasing the bias voltage in comparison to that of the typical etch technique. No indication is provided that a decrease from a high bias voltage to a low bias voltage would be beneficial or would be utilized in implementation of the '619 reference. The applicant submits that a decrease in voltage is likewise not disclosed in the other cited references.

The applicant submits that, at least for this reason, the claimed invention of claim 1, is not obvious in light of the cited references. The applicant notes that the same elements and the same references are used in the Office's rejection of claims 21, and 22, and that consequently, these claims are likewise not unpatentable. The applicant notes that claims 3-6, 8-10, 12-14, and 23-26 depend from the above claims 1, 21, and 22 respectively. As these claims depend from claims that are not unpatentable in light of the cited references, the applicant respectfully submits that at least for those reasons set forth above, these claims are likewise not unpatentable.

Further, with respect to the '708 reference, the Office cites the '708 reference as evidence of "a self aligned base recess using optical lithography and etching to recess a base layer to an n- GaN quasi-substrate layer 52 grown on the n+ GaN quasi-substrate layer 53". The applicant respectfully submits that the process of the '708 reference is simply inapplicable to the claimed invention. First, the claimed invention claims E-beam lithography, in contrast to the cited '708 reference. The '708 reference discloses the construction of a diode, not a transistor. The '708 reference utilizes a photoresist to create the etch window. The "708 reference discloses the use of RIE. The applicant notes that RIE will not work, it is simply too weak a method to effectively etch GaN. As noted in the specification of the claimed invention:

> **[0021]** One particular embodiment is fabricated using n-type GaN grown by hydride vapor phase epitaxy (HVPE) and molecular beam epitaxy on thick HVPE GaN quasi-substrates. The fabrication process employs isolation pads via helium (He) implantation and silicon nitride (SiN) deposition, as well as sub-micron chlorine-based high density inductively coupled plasma (ICP) etching of collector fingers patterned via e-beam lithography. Base Schottky contacts are deposited on the etched GaN layer prior to ohmic metal deposition so Schottky contacts on dry etched surfaces as well as low temperature

annealed (0-500.degree. C.) Schottky and ohmic contacts are characterized for their performance.

The applicant submits that with HVPE, metallic etch masks must be used, as photoresist is too fragile and were photoresist to be used for the etch between the fingers, the fingers themselves would erode, destroying the device. The applicant therefore submits that the disclosure of the '708 reference is inapplicable to the claimed invention, and in actuality teaches away from the claimed invention.

The applicant further notes it is consistent with the Supreme Court's recent decision in KSR Int'l Co. v. Teleflex Inc. et al. 550 U.S. __ (2007) that the propriety of combined references be judged in light of common sense. Indeed the KSR court specifically affirms the proposition that "a patent is composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. Although common sense directs one to look with care at a patent application that claims as innovation the combination of two known devices according to their established functions. . . inventions, in most, if not all, instances rely upon building blocks long since uncovered and claims discoveries almost of necessity will be combinations of what, in some sense, is already known." Id. 14. The applicant suggests that in the present circumstance, the Office cites a total of nine (9) references as basis for its rejection of the various the claims of the present invention, seven (7) of which are cited as the basis for the rejection of claim 1 and its dependants. Even an expansive and flexible approach to the test articulated in Graham v. John Deere Co. of Kansas City, 383 US 1, 17-18 and affirmed by the in KSR requires that the analysis of obviousness require that the scope and content of the prior art be determined. The cited references are not merely numerous, but drawn from several disparate processes and combined by the Office to achieve the claimed invention. The applicant respectfully submits that while it may be contrary to common sense to assert that a mere combination of some well known components is non-obvious, the same common sense militates against a determination that individual elements gleaned from widely disparate processes would render an invention obvious. The applicant submits that such a number of references is indicative of a *ex post facto*, hind sight, analysis. Even after KSR, it is inappropriate to use the Applicant's claims as a road map in selecting a combination of references to form a 103 rejection. Rather, there must be some objective reason to combine the teachings of the references to make the

claimed invention, lest the test for obviousness be debased to a mere "obvious to try" standard. Applicant cannot find such an objective reason.

In light of the above amendments and remarks, the applicant respectfully requests that the Office reconsider claims 1, 3-6, 8-10, 12-14, and 21-26, withdraw the respective rejections and objections to those claims and issue a timely Notice of Allowability.

Applicant believes the above amendments and remarks to be fully responsive to the Office Action, thereby placing this application in condition for allowance. No new matter is added. Applicant requests speedy reconsideration, and further requests that Examiner contact its attorney by telephone, facsimile, or email for quickest resolution, if there are any remaining issues.

Respectfully submitted,

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